

PATENT ABSTRACTS OF JAPAN

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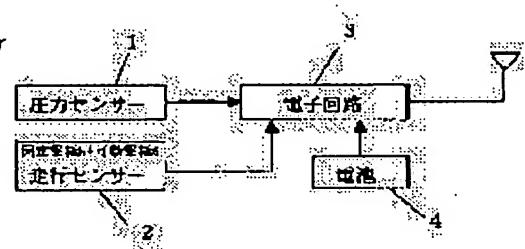
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(72)Inventor : OKUBO YOICHI

(54) TIRE AIR PRESSURE SENSOR**(57)Abstract:**

PROBLEM TO BE SOLVED: To provide a tire air pressure sensor equipped with a travel sensor with such high reliability that it prevents imperfect contact, as compared with conventional switch contact types, by detecting the travel of a vehicle not by a conventional mechanical contact opening/closing method, but by a highly reliable method of detecting it from changes in electrostatic capacity.

SOLUTION: The tire air pressure sensor comprises a pressure sensor 1 for detecting the pneumatic pressure of a tire, a travel sensor 2 for detecting the travel of the vehicle, an electronic circuit part 3 for transmitting the detected pressure to a receiver on the vehicle body by means of electric waves, and a battery 4 or the like for actuating the electronic circuit part 3. The travel sensor 2 is formed of a fixed electrode 5 and an opposite movable electrode 6 and determines that the vehicle is traveling when the electronic circuit part 3 detects a change in electrostatic capacity between the fixed electrode 5 and the movable electrode 6 caused by the displacement of the movable electrode 6 due to either a centrifugal force or acceleration produced by the rotation of the tire.

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CLAIMS

[Claim(s)]

[Claim 1] The pressure sensor 1 which detects the pneumatic pressure of a tire, and the transit sensor 2 which detects transit of a car, In the tire pneumatic sensor which consists of cell 4 grade for operating the electronic-circuitry section 3 of transmitting the detection pressure force to the receiver by the side of a car body through radio, and the electronic-circuitry section 3 concerned The transit sensor 2 concerned is formed with the movable electrode 6 which comes to carry out phase opposite with a fixed electrode 5. The tire pneumatic sensor constituted that it should detect that the electrostatic capacity between a fixed electrode 5 and a movable electrode 6 changes in said electronic-circuitry section 3, and should judge with a run state with the variation rate produced in a movable electrode 6 with the centrifugal force or acceleration by rotation of a tire.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the tire pneumatic sensor which can check the condition of the pneumatic pressure in the tire for automobiles by the vehicle room side.

[0002]

[Description of the Prior Art] In the conventional tire pneumatic sensor, as shown in drawing 3, when the centrifugal switch 7 was formed between the cell 4 and the electronic circuitry 3 and the travel speed became for example, 20 km/h, the centrifugal switch 7 was turned on, and the power source of the electronic-circuitry section 3 was turned on, and it had become the configuration that the actuation as a tire pneumatic sensor started.

[0003] It is an example of the centrifugal switch 7 concerned, and drawing 4 is a centrifugal force by transit, and the migration child 8 overcomes and moves to the force of a spring 9, and it is constituted that a contact 10 and a contact 11 should be made switch-on. There were problems, like in such a configuration, since the usual consumed electric current of an electronic circuitry is as small as several microA, it is necessary to make a contact 10 and a contact 11 into high-reliability extremely or, since a certain amount of magnitude is required for the migration child 8 and a spring 9, the own configuration of a tire pneumatic sensor becomes large, or cost becomes high in order to make it structure which ceases against the vibration in a tire or an impact.

[0004]

[Problem(s) to be Solved by the Invention] This invention was not made in order to solve the above troubles, and it tends to offer the tire pneumatic sensor which adopted the method which is not a mechanical contact closing motion method like before, and detects a run state by change of reliable electrostatic capacity.

[0005]

[Means for Solving the Problem] The pressure sensor with which the pneumatic sensor of this invention detects the pneumatic pressure of a tire, The transit sensor which detects transit, and the electronic-circuitry section which transmits a tire pressure to the receiver by the side of a car body through radio while calculating and processing the sensor signal concerned. Consist of a cell for operating the electronic-circuitry section concerned etc., carry out phase opposite of the transit sensor concerned with a fixed electrode, and it forms with a movable electrode. It constitutes that the thing which arise in a movable electrode and which it bends and the electrostatic capacity between a fixed electrode and a movable electrode changes with variation rates should be detected in said electronic-circuitry section, and should be judged to be a run state with the centrifugal force or acceleration by rotation of a tire.

[0006]

[Embodiment of the Invention] Hereafter, the example of this invention is explained based on a drawing. The pressure sensor 1 which drawing 1 is the block diagram of the tire pneumatic sensor of this invention, and detects the pneumatic pressure of a tire, While processing the electrostatic-capacity change by the transit sensor 2 which detects the transit which consists of a fixed electrode 5 and a movable electrode 6, and the transit sensor 2 concerned and judging transit initiation or a halt It responds to the result, the signal of a pressure sensor 1 is calculated and processed, and it consists of cell 4 grades for operating the electronic-circuitry section 3 which transmits to the receiver by the side of a car body through radio, and the electronic-circuitry section 3 concerned.

[0007] Drawing 2 is the structure section Fig. of said transit sensor 2, and is formed from the movable electrode 6 which bends with the centrifugal force or acceleration by rotation of a fixed electrode 5 and a tire, and produces a variation rate.

[Function of the Invention] According to the pneumatic sensor of this invention, it can be bent by the centrifugal force or acceleration by rotation of a tire in a movable electrode, and a variation rate can be produced, consequently the electrostatic capacity between movable electrodes and fixed electrodes concerned can change, and the transit start of a vehicle can be detected by detecting it in an electronic circuitry.

[0008]

[Effect of the Invention] As mentioned above, since the tire pneumatic sensor of this invention is the structure of detecting the electrostatic-capacity change between the movable electrodes and fixed electrodes which are produced with the centrifugal force or acceleration by rotation of a tire in an electronic circuitry, there is no trouble by the poor contact of a contact like a switch-contact method, and a very reliable tire pneumatic sensor with a transit sensor can be offered.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram of the tire pneumatic sensor by this invention.

[Drawing 2] The structure section Fig. of the transit sensor which constitutes the tire pneumatic sensor by this invention.

[Drawing 3] The block Fig. of the tire pneumatic sensor at the time of using the conventional centrifugal switch.

[Drawing 4] The structure section Fig. of the conventional centrifugal switch.

[Description of Notations]

- 1 Pressure Sensor
- 2 Transit Sensor
- 3 Electronic-Circuitry Section
- 4 Cell
- 5 Fixed Electrode
- 6 Movable Electrode
- 7 Centrifugal Switch
- 8 Migration Child
- 9 Spring
- 10 Contact
- 11 Contact

[Translation done.]

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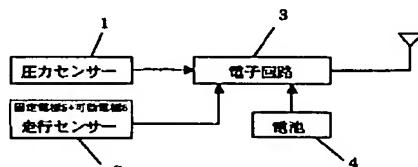
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FF49 GG31

(54)【発明の名称】 タイヤ空気圧センサー

(57)【要約】

【課題】 本発明は、走行状態を従来のような機械式の接点開閉方式ではなく、信頼性の高い静電容量の変化で検出する方式を採用することにより、従来のスイッチ接点方式に比べて接点の接触不良が起きない、極めて信頼性の高い走行センサー付きタイヤ空気圧センサーを提供しようとするものである。

【解決手段】 タイヤの空気圧を検出する圧力センサー1と、車両の走行を検知する走行センサー2と、検出圧力を電波で車体側の受信機に送信する等の電子回路部3と、当該電子回路部3を作動させるための電池4等からなるタイヤ空気圧センサーにおいて、当該走行センサー2を固定電極5と相対向してなる可動電極6とで形成し、タイヤの回転による遠心力または加速度によって可動電極6に生じる変位によって固定電極5と可動電極6の間の静電容量が変化することを前記電子回路部3で検出して走行状態と判定すべく構成したタイヤ空気圧センサーである。



【特許請求の範囲】

【請求項1】タイヤの空気圧を検出する圧力センサー1と、車両の走行を検知する走行センサー2と、検出圧力を電波で車体側の受信機に送信する等の電子回路部3と、当該電子回路部3を作動させるための電池4等からなるタイヤ空気圧センサーにおいて、当該走行センサー2を固定電極5と相対向してなる可動電極6とで形成し、タイヤの回転による遠心力または加速度によって可動電極6に生じる変位によって固定電極5と可動電極6の間の静電容量が変化することを前記電子回路部3で検出して走行状態と判定すべく構成したタイヤ空気圧センサー。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、自動車用タイヤ内の空気圧の状態を車室側で確認できるタイヤ空気圧センサーに関するものである。

【0002】

【従来の技術】従来のタイヤ空気圧センサーでは、図3に示すように、遠心力スイッチ7を電池4と電子回路3の間に設け、走行速度が例えば20km/hになると、遠心力スイッチ7がONになり、電子回路部3の電源が入り、タイヤ空気圧センサーとしての動作が始まる構成になっていた。

【0003】図4は、当該遠心力スイッチ7の一例で、走行による遠心力で、移動子8がばね9の力で打ち勝って移動し、接点10と接点11を導通状態にすべく構成されている。このような構成の場合、電子回路の通常の消費電流が数μAと小さいため、接点10と接点11を極めて高信頼性にする必要があるとか、移動子8とばね9にある程度の大きさが必要であるために、タイヤ空気圧センサー自身の形状が大きくなるとか、タイヤ内の振動や衝撃に絶えるような構造にするために、コストが高くなるなどの問題があった。

【0004】

【発明が解決しようとする課題】本発明は、上記のような問題点を解決するためになされたもので、走行状態を従来のような機械式の接点開閉方式ではなく、信頼性の高い静電容量の変化で検出する方式を採用したタイヤ空気圧センサーを提供しようとするものである。

【0005】

【課題を解決するための手段】本発明の空気圧センサーは、タイヤの空気圧を検出する圧力センサーと、走行を検知する走行センサーと、当該センサー信号を演算・処理すると共にタイヤ空気圧を電波で車体側の受信機に送信する電子回路部と、当該電子回路部を作動させるための電池等からなり、当該走行センサーを固定電極と相対向して可動電極とで形成し、タイヤの回転による遠心力または加速度によって可動電極に生じるたわみ変位によって固定電極と可動電極の間の静電容量が変化すること

を前記電子回路部で検出して走行状態と判断すべく構成したものである。

【0006】

【発明の実施の形態】以下、本発明の実施例を図面に基づいて説明する。図1は、本発明のタイヤ空気圧センサーの構成図で、タイヤの空気圧を検出する圧力センサー1と、固定電極5と可動電極6からなる走行センサー2と、当該走行センサー2による静電容量変化を処理し、走行開始または停止を判定するとともに、その結果に応じて圧力センサー1の信号を演算・処理し、電波で車体側の受信機に送信する電子回路部3と、当該電子回路部3を作動させるための電池4等から構成されている。

【0007】図2は、前記走行センサー2の構造断面図で、固定電極5とタイヤの回転による遠心力または加速度によりたわみ変位を生ずる可動電極6から形成されている。

【発明の作用】本発明の空気圧センサーによれば、タイヤの回転による遠心力または加速度で可動電極にたわみ変位を生じ、その結果、当該可動電極と固定電極の間の静電容量が変化し、それを電子回路で検出することにより、車の走行スタートを検出することができる。

【0008】

【発明の効果】以上のように、本発明のタイヤ空気圧センサーは、タイヤの回転による遠心力または加速度により生ずる可動電極と固定電極の間の静電容量変化を電子回路で検出する構造であるために、スイッチ接点方式のような接点の接触不良によるトラブルは皆無であり、極めて信頼性の高い走行センサー付きタイヤ空気圧センサーを提供することができる。

【図面の簡単な説明】

【図1】 本発明によるタイヤ空気圧センサーのブロック図。

【図2】 本発明によるタイヤ空気圧センサーを構成する走行センサーの構造断面図。

【図3】 従来の遠心力スイッチを使った場合のタイヤ空気圧センサーのブロック図。

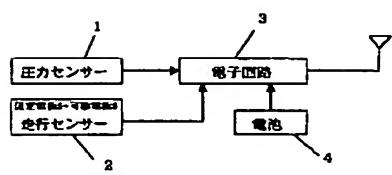
【図4】 従来の遠心力スイッチの構造断面図。

【符号の説明】

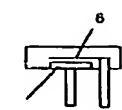
- | | |
|----|-----------|
| 40 | 1 圧力センサー |
| | 2 走行センサー |
| | 3 電子回路部 |
| | 4 電池 |
| | 5 固定電極 |
| | 6 可動電極 |
| | 7 遠心力スイッチ |
| | 8 移動子 |
| | 9 ばね |
| | 10 接点 |
| | 11 接点 |

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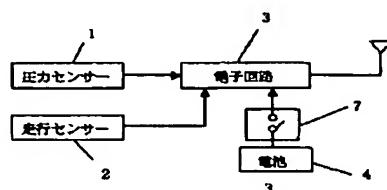
【図1】



【図2】



【図3】



【図4】

